

2015 Monitoring Summary



Gillespie Creek at Alexander Motorway Crossing (Lawrence County) (34.38009/-87.22844)

BACKGROUND

Gillespie Creek was monitored as part of the 2015 assessment of the Tennessee River Basins. The objectives of the project were to assess the biological integrity of each monitoring site and to estimate overall water quality within the basin. Additionally, Gillespie Creek is among the least-disturbed watersheds in the Dissected Plateau ecoregion based on landuse, road density, and population density. Therefore, these data will also be used to evaluate the use of Gillespie Creek as a “*best attainable*” condition reference watershed for comparison with other streams in ecoregion 68e.



Figure 1. Gillespie Creek at GILL-1, April 14, 2014.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Gillespie Creek at GILL-1 is a small *Fish & Wildlife (F&W)* stream that drains approximately three square miles of land in Lawrence County. Based on the 2011 National Land Cover Dataset, landuse within the watershed is primarily forest (94%). As of April 1, 2016, no outfalls were active within the watershed.

REACH CHARACTERISTICS

General observations (Table 2) and a habitat assessment (Table 3) were completed during the macroinvertebrate assessment. In comparison with reference reaches in the same ecoregion, they give an indication of the physical condition of the site and the quality and availability of habitat. Gillespie Creek at GILL-1 is a glide-pool stream with a sand substrate (Figure 1). Habitat quality and availability were rated *marginal* for supporting diverse aquatic macroinvertebrate communities due to poor instream habitat, heavy sediment deposition, and weak vegetative stability.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin	Tennessee R	
Drainage Area (mi ²)	3	
Ecoregion ^a	68E	
% Landuse ^b		
Wetland	Woody	4%
Forest	Deciduous	57%
	Evergreen	11%
	Mixed	26%
	Shrub/scrub	<1%
	Grassland/herbaceous	<1%
	Pasture/hay	<1%
	Development	<1%
	Open space	<1%
Population/km ^{2c}	6	

a. Dissected Plateau

b. 2011 National Land Cover Dataset

c. 2010 US Census

Table 2. Physical characteristics of Gillespie Creek at GILL-1, May 12, 2015.

Physical Characteristics		
Width (ft)	25	
Canopy Cover	Shaded	
Depth (ft)		
	Run	0.5
	Pool	2.0
% of Reach		
	Run	70
	Pool	30
% Substrate		
	Clay	2
	Gravel	10
	Hardpan Clay	10
	Sand	68
	Silt	2
	Organic Matter	8

BIOASSESSMENT RESULTS

Benthic macroinvertebrate communities were sampled using ADEM's Intensive Multi-habitat Bioassessment methodology (WMB-I). The WMB-I uses measures of taxonomic richness, community composition, and community tolerance to assess the overall health of the macroinvertebrate community. Each metric is scored on a 100 point scale. The final score is the average of all individual metric scores. Metric results indicated the macroinvertebrate community to be in *fair* community condition (Table 4).

Table 3. Results of the habitat assessment conducted on Gillespie Creek at GILL-1, May 12, 2015.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	30	Poor<31
Sediment Deposition	23	Poor <31
Sinuosity	48	Marginal (31-54)
Bank Vegetative Stability	26	Poor <31
Riparian Buffer	95	Optimal >84
Habitat Assessment Score	80	
%f Maximum Score	44	Marginal (31-56)

Table 4. Results of the macroinvertebrate bioassessment conducted in Gillespie Creek at GILL-1, May 12, 2015.

Macroinvertebrate Assessment		
	Results	Scores
Taxa richness measures		(0-100)
# EPT taxa	13	39
Taxonomic composition measures		
% Non-insect taxa	11	59
% Dominant taxon	25	63
% EPC	16	29
Functional feeding group measures		
% Predators	23	96
Tolerance measures		
% Taxa as Tolerant	33	47
WMB-I Assessment Score	---	55
WMB-I Assessment Rating		Fair (39-58)

WATER CHEMISTRY

Results of water chemistry are presented in Table 5. In situ measurements and water samples were collected monthly, March through August of 2015 to help identify any stressors to the biological communities. Gillespie Creek at GILL-1 was sampled only for physical characteristics, dissolved oxygen (DO), and pH. There were three station visits where there was no flow, so measurements could not be taken. Median specific conductance values were higher than background levels for ecoregion 68e. All other parameters were within expected ranges.

Table 5. Summary of water quality data collected March-October, 2015. Minimum (Min) and maximum (Max) values calculated using minimum detection limits (MDL) when results were less than this value. Median, average (Avg), and standard deviations (SD) values were calculated by multiplying the MDL by 0.5 when results were less than this value.

Parameter	N	Min	Max	Med	Avg	SD
Physical						
Temperature (°C)	6	15.0	19.1	17.6	17.4	1.6
Turbidity (NTU)	6	2.7	9.1	6.0	6.0	2.1
Specific Conductance (µmhos/	6	102.0	241.0	175.5 ^G	168.0	49.9
Monthly Stream Flow (cfs)	9	0.0	9.0	0.3	2.0	3.3
Measured Stream Flow (cfs)	6	0.2	9.0	1.1	3.0	3.8
Chemical						
Dissolved Oxygen (mg/L)	6	7.6	9.7	8.2	8.4	0.8
pH (SU)	6	7.2	7.9	7.4	7.5	0.3

G=value higher than median concentration of all verified ecoregional reference reach data collected in the ecoregion 68e; N=# samples.

SUMMARY

To be used for comparison with other streams, “best-attainable” reference reaches must be representative of other streams in the ecoregion. Gillespie Creek was typical of other streams in the Dissected Plateau ecoregion, although in-stream habitat quality was rated as *marginal*. The macroinvertebrate assessment resulted in a *fair* rating for community condition. With the exception of specific conductance, water quality results are within normal ranges for this stream type. However, more water quality parameters should be sampled in the future to more fully assess the water quality and verify its status as a reference reach site.

FOR MORE INFORMATION, CONTACT:
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